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LEE J. TIEDRICH
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DOCKET FILE COPY ORIGINAL

March 19, 1996

VIA MESSENGER

EX PARTE OR LATE FILED

The Honorable William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: ET Docket No. 94-124
Amendment of Parts 2, 15, and 97 of the Commission's Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications

Dear Mr. Caton:

On Monday March 18th, Sky Station International, Inc. ("Sky Station") met with Richard M. Smith, Chief of OET and several members of his staff, to discuss the authorization of a Global Stratospheric Telecommunications Service using spectrum proposed for millimeter wave operations in the above-referenced proceeding. The discussion focused on the issues outlined in the attached materials which were provided during the presentation. Please associate these materials with the above-referenced proceeding.

Any questions concerning this matter should be addressed to Paul Mahon of Mahon & Patusky at (202) 483-4000 or Lee J. Tiedrich of Covington & Burling at (202) 662-5403.

Sincerely,

Lee J. Tiedrich

LJT/djw
Attachment

cc: Mr. Richard M. Smith

SKY STATION INTERNATIONAL INC.

FREQUENTLY ASKED QUESTIONS

GSTS

Acronym: Global Stratospheric Telecommunications Service
ITU/FCC Proposed Definition: "A radiocommunications service between fixed stations or mobile stations and stratospheric stations intended for operation beyond the boundaries of a country or continent."
Bandwidth: 47.2-47.5 GHz Uplink; 47.9-48.2 GHz Downlink

SKY STATION INTERNATIONAL INC. (SSI)

Company: Private company applicant/petitioner to FCC for license
Bandwidth: Pro rata share of GSTS bandwidth
Channel Bandwidth: 70 KHz
Data Rate: 64 kbps with 10 exp-5 BER (with adequate propagation margin)
Altitude: 18 Miles, 30 Kilometers, 100,000 feet
Coverage Area:
- High Area Cov. > 30 Deg. 30 mi rad. circle
- Wide Area Cov.> 10 Deg. 100 mi rad. circle
- Footprint Area > Horizon 350 mi rad. circle

Number of Platforms: 250 Covering All Major Urban and Rural Areas
Cells Per Platform: 2,100
Cell Size:
- HAC -- Average 5 square miles; Total = 3,000 sq. mi.
- WAC -- Average 50 Square miles; Total = 30,000 sq. mi.
- FAC -- Average 500 square miles; Total = 400,000 sq. mi.

Frequency Reuse: Hexagon Pattern (7 times), with 2,100 cells
Stratus™ Communicator Characteristics:
- Services -- Full Duplex Internet/Web; Picturephone/Telephone
- Power -- 100 Milliwatts HAC and WAC; 400 Milliwatts FAC
- Antenna -- 3 dBi HAC; 23 dBi WAC; 36 dBi FAC

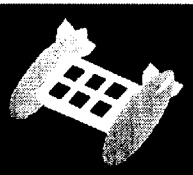
Source Coding: Draft MPEG-4 or Draft ITU-T Recommendation H.263
Modulation: 2/3 rate k=7, R-S, QPSK
Platform Power:
- 1 Megawatt Solar Panel, 50% Available End of Life
- 20 Kilowatts for Non-Communications
- 33% DC-RF Efficiency
- 160 KWatts RF (overpowered for > 3dB extra margin)

Platform Capacity:
- 300 times user bandwidth (2,100 cells divided by 7 times resuse), divided by 70 KHz
- At Bandwidth limit, assuming 50% used for base station and 9% guardband width
- 300*140MHz/70KHz=600,000 Simultaneous Users = 6,000,000 Subscribers at 0.1 Erlang

System Capacity: Nominally, Platform Capacity times 250 = 1.5 Billion Subscribers Worldwide

Sky Station International Inc.

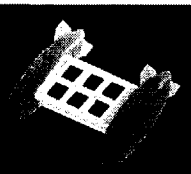
Regulatory Briefing



Service Definition

GSTS:
Global Stratospheric Telecommunications Service

"a *Radiocommunications service* between *stratospheric stations* and any combination of *mobile stations* and *fixed stations*. with such service intended for capability of operation beyond the geographical limits of a country or continent."



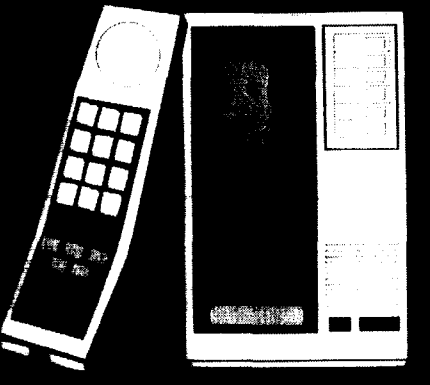
Stratospheric Station Definition

***Stratospheric Station*: A *station* located at a fixed position in the stratosphere**

Note: The stratosphere is that portion of the earth-space environment which is too high for air-dependant flight and too low for orbital maintenance; approximately 13-50 miles above the earth: above 99% of the breathable atmosphere.

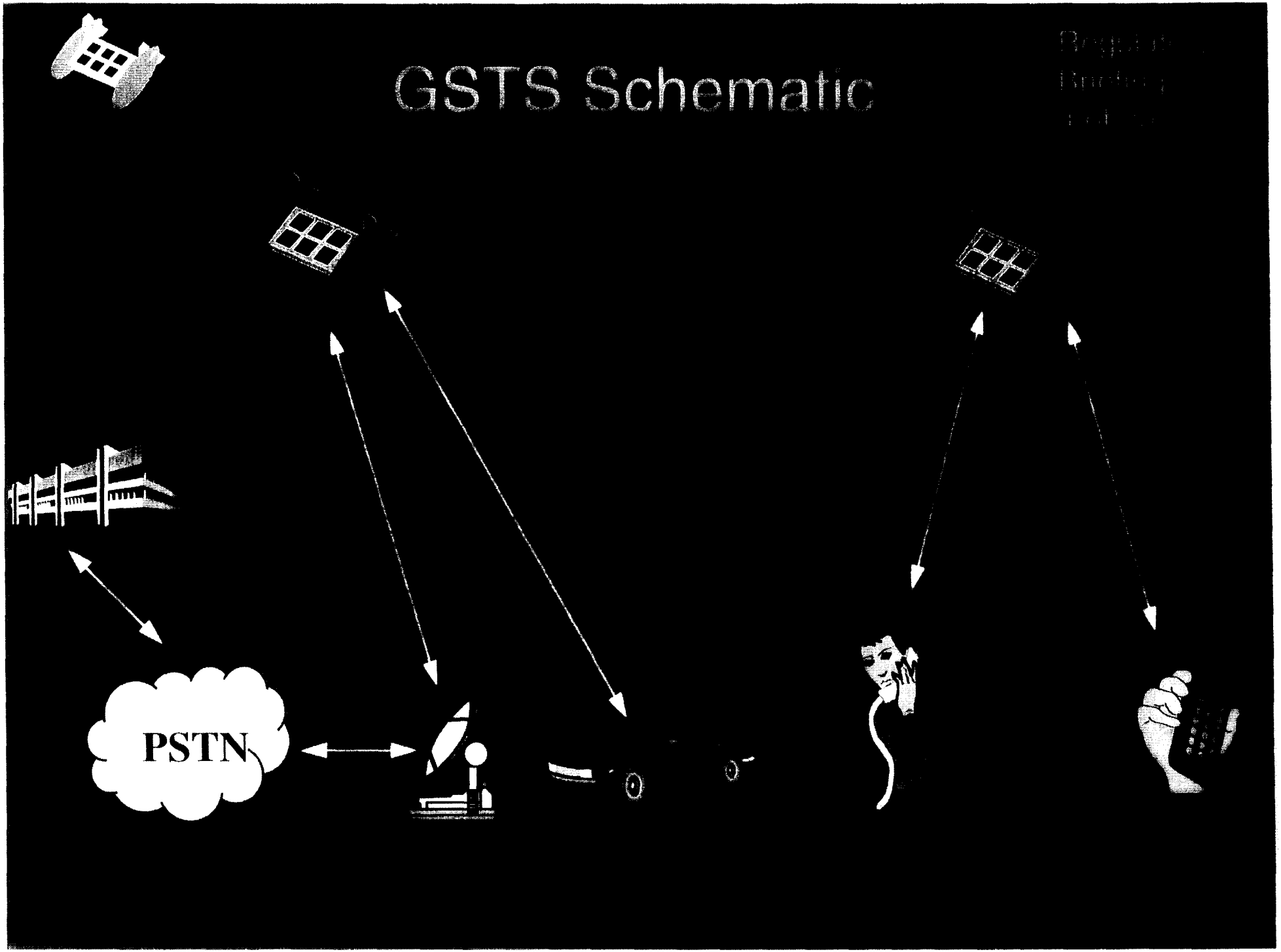
GSTS Applications

Global and fully portable 10¢/minute picturephone service, with capacity for > 1 billion users.



Global and fully portable 10¢/minute wireless world wide web connectivity with capacity for > 1 billion users

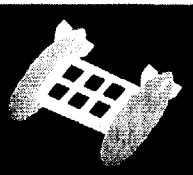
GSTS Schematic



Markets and Competition Matrix

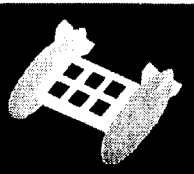
Mobility (columns) / **Cost to user** (rows)

Cost to user	High mobility	Medium mobility	Low mobility	Global Coverage
High	LEO MSS (eg Iridium)		Ka Band (eg Teledesic)	All Geography
Medium		GSTS (eg Sky Station)		All People
Low	Cellular & PCS (eg Sprint Spectrum)		Fiber Optic (eg Cable)	All Cities
Bandwidth to user	Low	Medium	High	



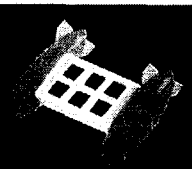
GSTS Billion Person Capacity for Broadband Portable Service

- 300 times user bandwidth (2,100 cells divided by 7 times reuse), divided by 70 KHz.
- At Bandwidth limit, assuming 50% used for base station and 9% guardband width
- 300 * 140 MHz/70 KHz = 600,000 Simultaneous Users 6,000,000 Subscribers at 0.1 Erlang
- Nominally, Platform Capacity times 250 = 1.5 Billion Subscribers Worldwide.



Why Sky Stations Now?

- Stratospheric Platforms are old idea.
- New technology, using GPS, makes geostationary (Fixed location over earth) platforms practical
- New composite materials and electronics make long duration (10 years) and high capacity communications practical.
- Concepts like Iridium and Teledesic validated the Global Wireless market.



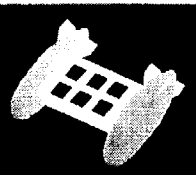
Sky Station International Inc. (SSI) Schedule

1999 2000 2001 2002 2003 2004

1% 20% 40% 60% 80% 90%

GSTS Complete

Coverage of world's population



GSTS Spectrum Requirements

Regulatory Briefing Part 30

47.2 - 47.5 GHz (Earth-to-Stratosphere)
47.9 - 48.2 GHz (Stratosphere-to-Earth)

Current Allocation: 47.2 - 50.2 GHz is allocated to Fixed, Mobile, Fixed Satellite (Earth-to-Space)

Proposed FCC Allocation: 47.2 - 48.2 GHz should be limited to licensed millimeter wave services

Our Proposal:

1. **Revise footnotes 901 and US297 to limit use of required sub-bands to GSTS**
2. **Create rules for a GSTS**

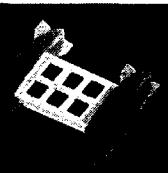
Frequency Allocation

GHz 47.2 - 50.2 International Allocation to Services

Region 1	Region 2	Region 3
47.2 - 50.2 FIXED FIXED-SATELLITE (Earth-to-space) 901 MOBILE 905 904		

GHz 47.2 - 50.2 United States Allocation to Services

Government Allocation	Non-Government Allocation
FIXED FIXED-SATELLITE (Earth-to-space) MOBILE US264, US297, 904	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE US264, US297, 904



Footnote 901 Language

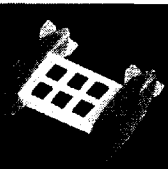
"The allocation of the spectrum for the fixed-satellite service in the bands 42.5 - 43.5 GHz and 47.2 - 50.2 GHz for earth-to-space transmission is greater than that in the band 37.5 - 39.5 GHz for space-to-earth transmission in order to accomodate feeder links to broadcasting satellites. Administrations are urged to take all practical steps to reserve the band 47.2 - 49.2 GHz for feeder links for the broadcasting satellite service operating in the band 40.5 - 42.5 GHz".

Proposed Revised Footnote 901 Language

"Use of the bands 47.2 - 47.5 GHz (Earth-to- stratosphere) and 47.9 - 48.2 GHz (stratosphere-to-earth) by the fixed service and by the mobile service is limited to global stratospheric telecommunications service. Stations in the fixed-satellite service may be operated subject to not causing harmful interference to the global stratospheric telecommunications service.

. . .

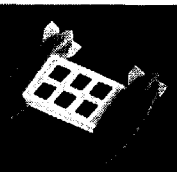
Administrations are urged to take all practical steps to reserve the band 47.5 - 47.9 GHz and 48.2 - 49.2 GHz for feeder links for the broadcasting-satellite service operating in the band 40.5 - 42.5 GHz."



Footnote US297 Language

Current: "The bands 47.2 - 49.2 GHz and 74.0 - 75.5 GHz are also available for feeder links for the broadcasting satellite service"

Proposed: "Use of the bands 47.2 - 47.5 GHz (Earth-to-stratosphere) and 47.9 - 48.2 GHz (Stratosphere-to-earth) by the fixed service and by the mobile service is limited to global stratospheric telecommunications service. The bands 47.2 - 47.5 GHz, 47.5 - 47.9 GHz, 48.2 - 49.2 GHz and 74.0 - 75.5 GHz are also available for feeder links for the broadcasting-satellite service."



Why 47.2 - 47.5 GHz & 47.9 - 48.2 GHz ?

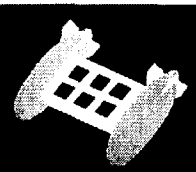
- 300 MHz in each direction is needed for a non mutually exclusive billion person mass-access (10c/minute) service.
- Very high elevation angles of GSTS are compatible with the severe losses of the millimeter band.
- Least congested non-government band allocated to fixed and mobile service.
- Only impact is to reduce an unused FSS and BSS feeder-link band from 2000 MHz bandwidth to 1400 MHz bandwidth.

Proposed Rules for GSTS

- All technically, financially and legally qualified applicants authorized to launch with 300+300 MHz but to power only a pro rata percentage of the bandwidth, after international coordination.
- Failure to meet construction and launch milestones forfeits bandwidth back to spectrum assignment pool.
- No mutual exclusivity.

Proposed Technical Qualifications

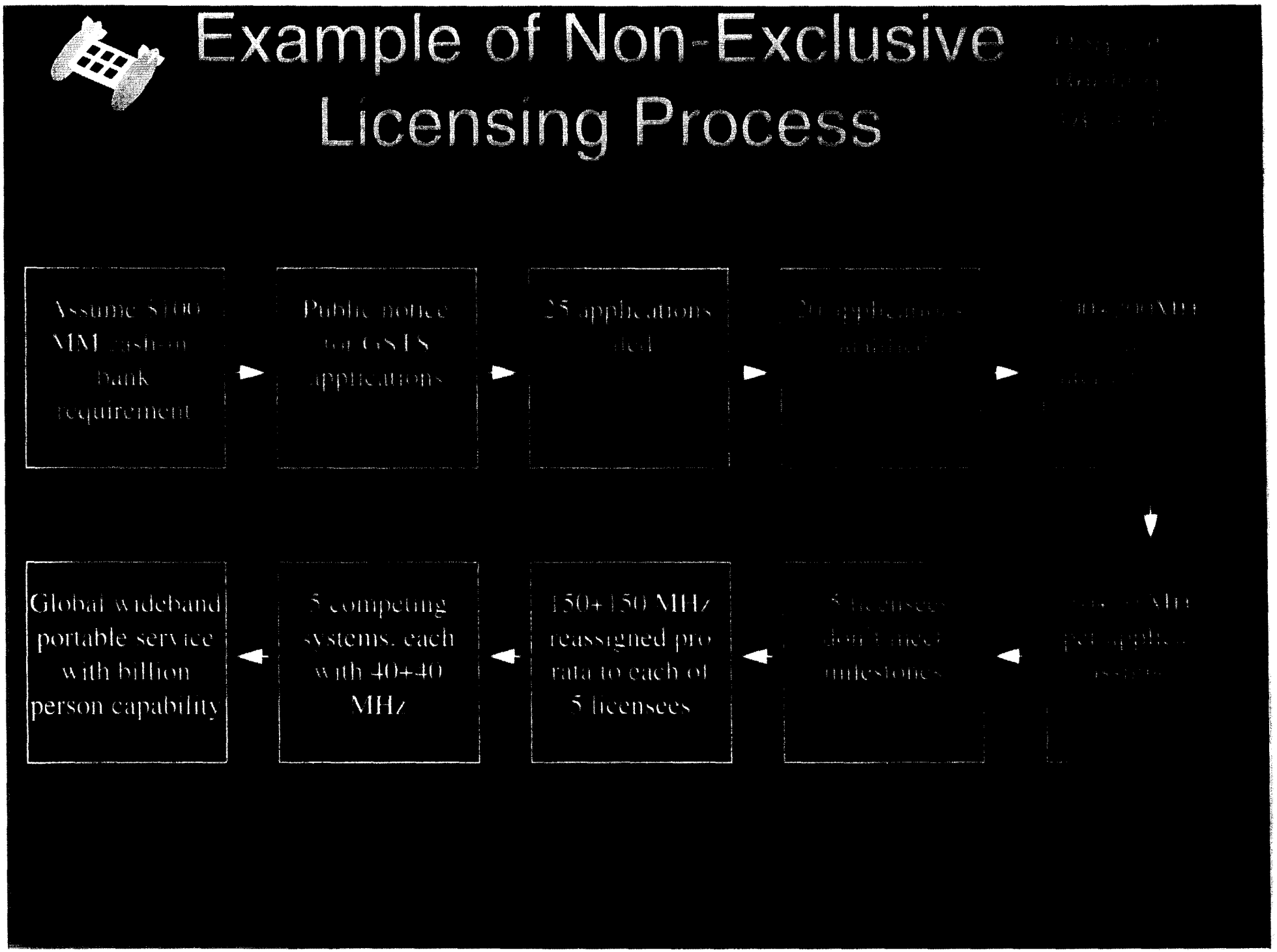
- Documentation of GSTS technology (e.g., ability to remain geostationary)
- Ability to provide coverage to at least 80% of world's population
- Engineering certifications



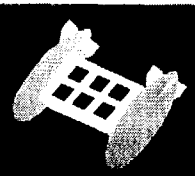
Proposed Legal/Financial Qualifications

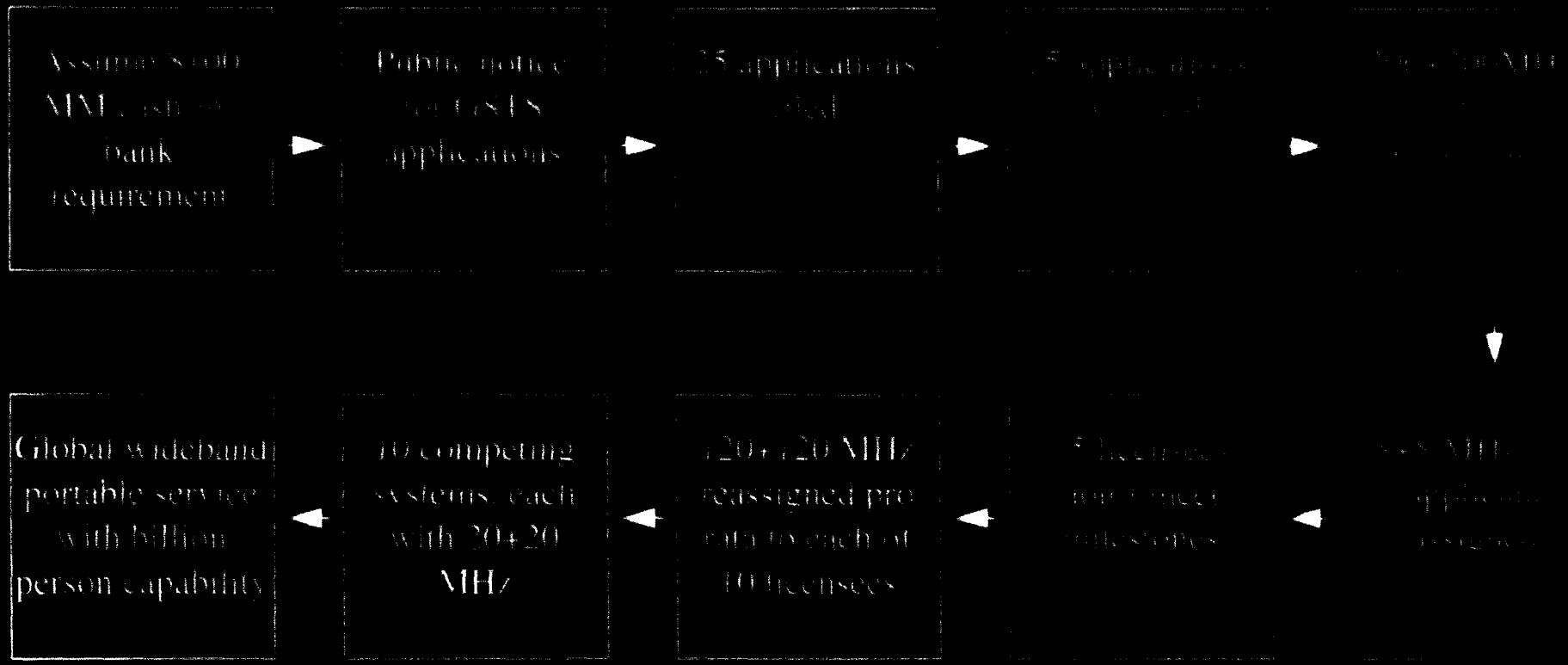
- Cash in bank for first n sky stations.
- Meet foreign ownership limitations.
- Agreement to international coordination and national authorization constraints.

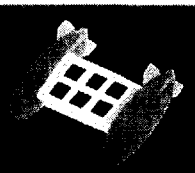
Example of Non-Exclusive Licensing Process



Example of Non-Exclusive Licensing Process

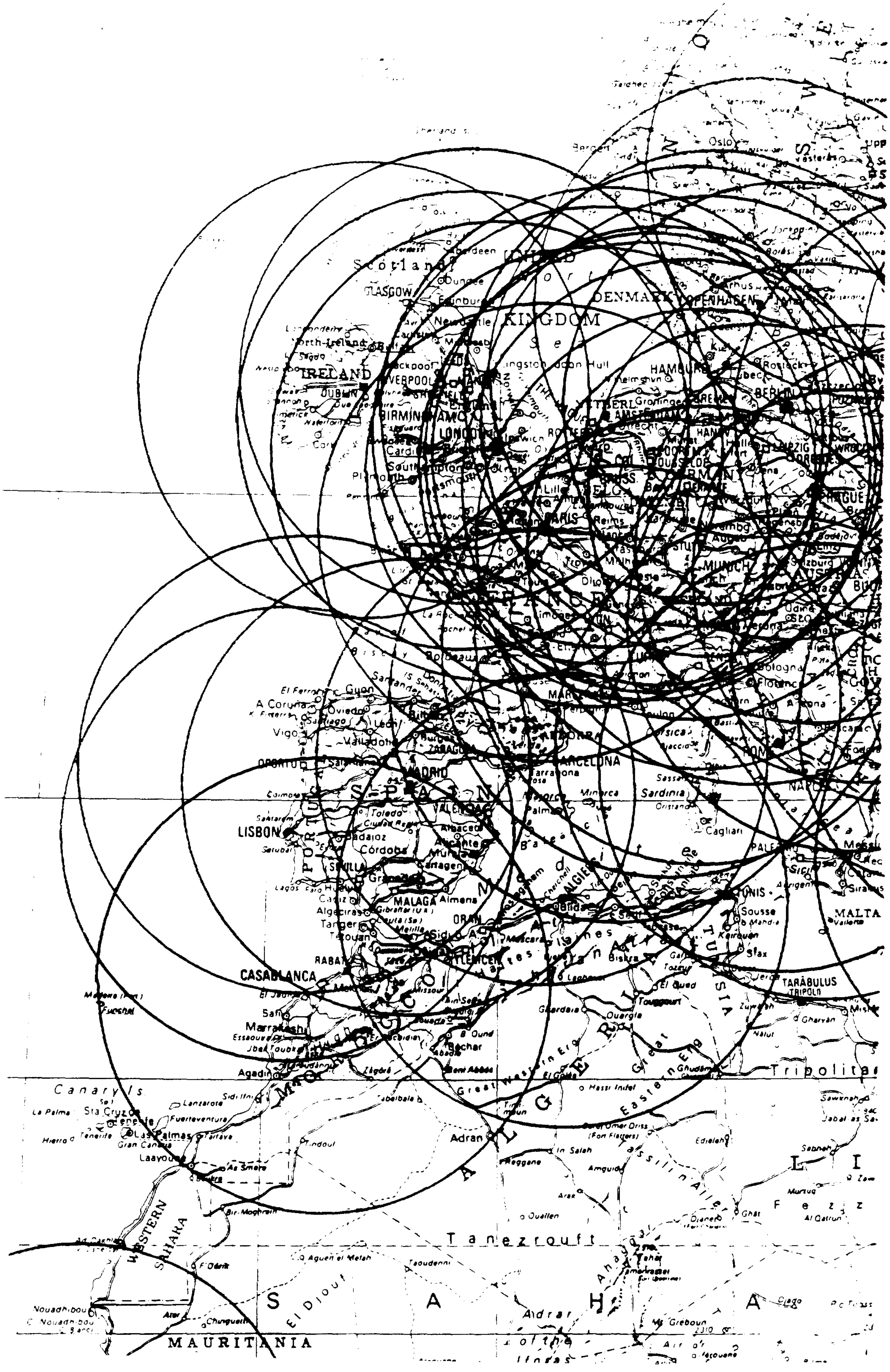






Requested Government Actions

- Get GSTS definitions and revision of footnote 901 on the agenda for WRC-97.
- Issue NPRM to establish rules for a non-MX GSTS in the existing fixed/mobile allocation at 47 GHz, including revision of footnote US297.
- Authorize Sky Station International, Inc. to start constructing and operating a GSTS at its own risk (Experimental service in the DC-NY corridor).



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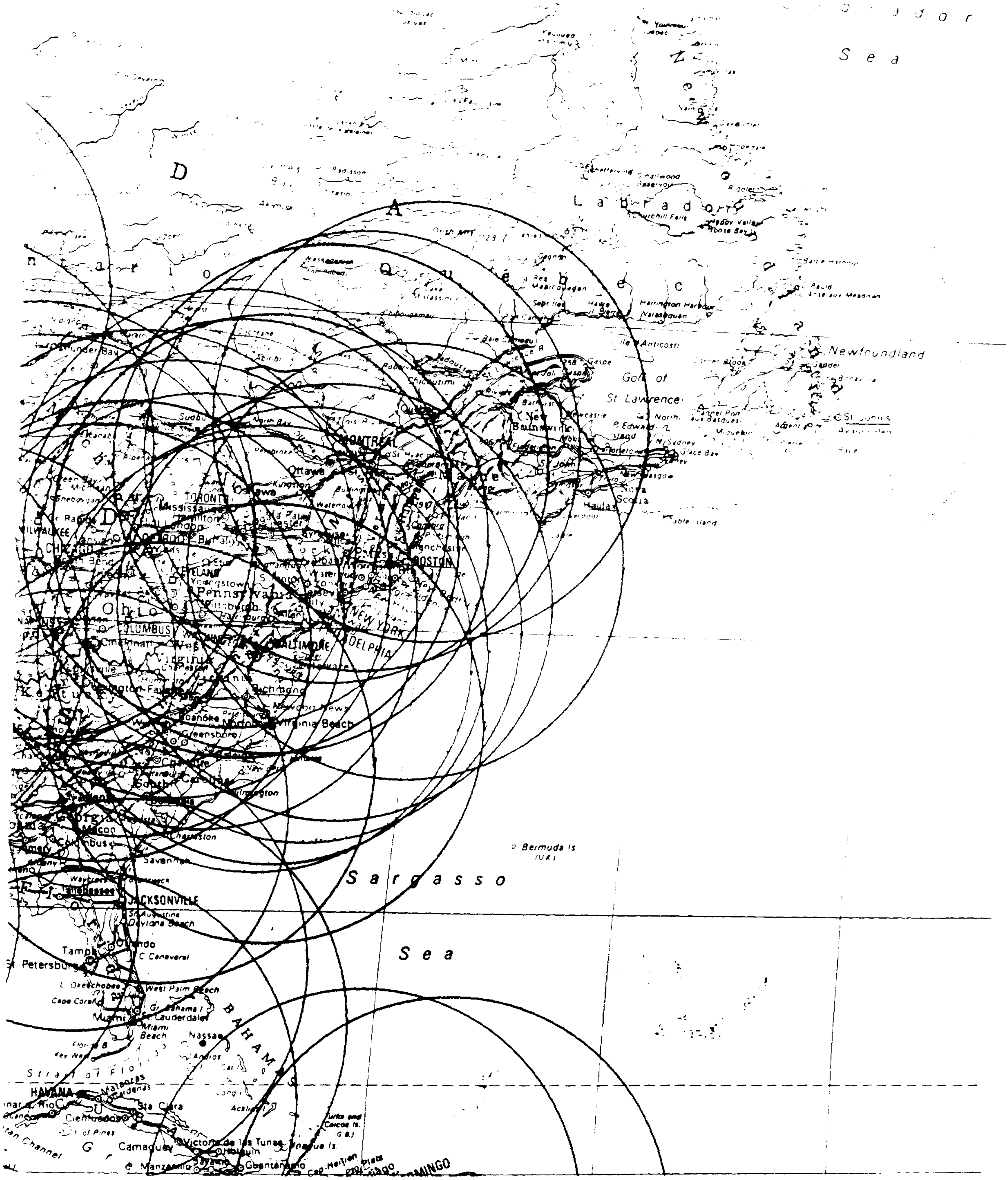

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